

# Simple Radiowave-Based Method For Measuring Peripheral Blood Flow Project

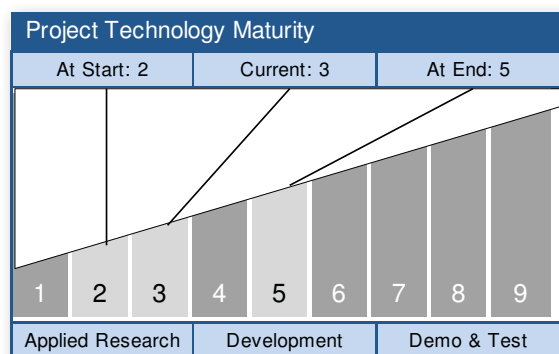
Center Independent Research & Developments: KSC IRAD Program  
Mission Support Directorate ( MSD )

National Aeronautics and  
Space Administration



## ABSTRACT

Project objective is to design small radio frequency based flow probes for the measurement of blood flow velocity in peripheral arteries such as the femoral artery and middle cerebral artery. The result will be the technological capability to measure peripheral blood flow rates and flow changes during various environmental stressors such as microgravity without contact to the individual being monitored. This technology may also lead to an easier method of detecting venous gas emboli during extravehicular ...**Read more on the last page.**



Technology Area: TA (Primary)

## ANTICIPATED BENEFITS

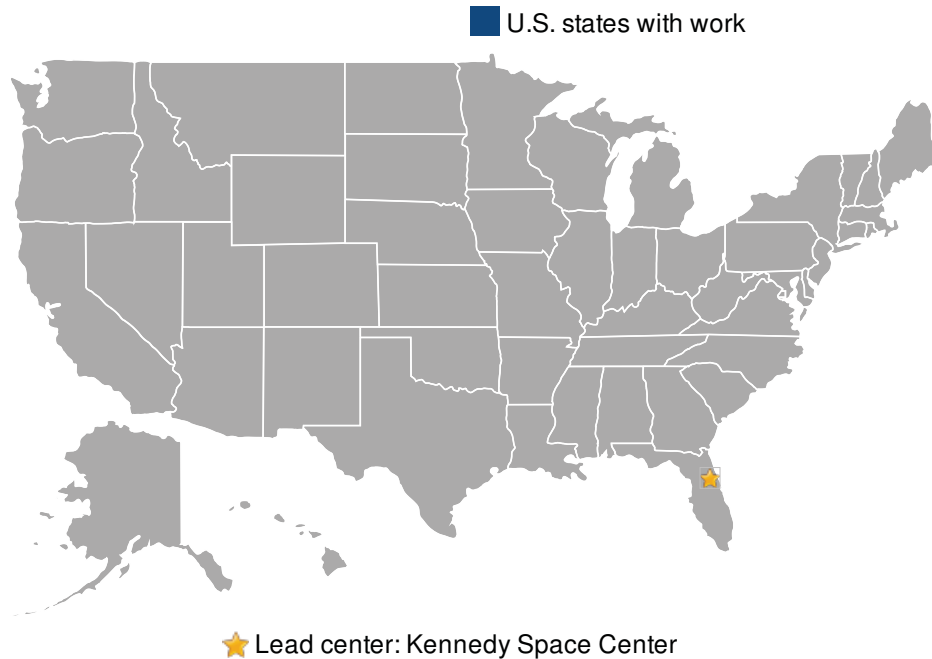
### To NASA funded missions:

NASA: Aboard the ISS, noncontact monitoring of heart rate, cardiac output and respiration is needed in both exercise and EVA. At KSC, monitoring is needed in stressful tasks, i.e. firefighting and SCAPE Department of Defense: Health monitoring of troops in combat Clinical Emergency Medicine: Immediate assessment of shock NASA, DoD, NIH, many health care industry applications.

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Read more on the last page.





## Contributing Partners

DoD, Department of NAVY

## DETAILED DESCRIPTION

This technology will be a quantum advance in hemodynamic monitoring and will be applicable in numerous situations such as for immediate assessment and monitoring of patients in life-threatening emergencies, during environmental stressors, and in performance of hazardous occupational tasks. For NASA these benefits will apply to both flight and ground personnel. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies.

### MANAGEMENT

**Program Manager:**

Nancy Zeitlin

**Project Manager:**

David Tipton

**Principal Investigator:**

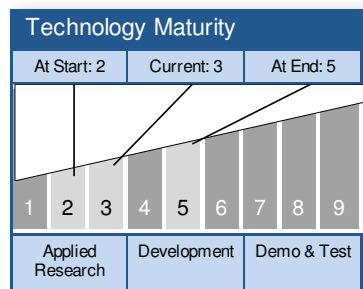
David Bush

**Co-Investigators:**

Robert Cummings  
Barry Slack

## TECHNOLOGY DETAILS

### Radiofrequency Impedance Interrogation (RFII)



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This technology is categorized as a hardware system for other applications

- Technology Area
  - TA03 Space Power & Energy Storage (Additional)
  - TA06 Human Health, Life Support & Habitation Systems (Additional)
  - TA07 Human Exploration Destination Systems (Additional)

### CAPABILITIES PROVIDED

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## TECHNOLOGY DETAILS

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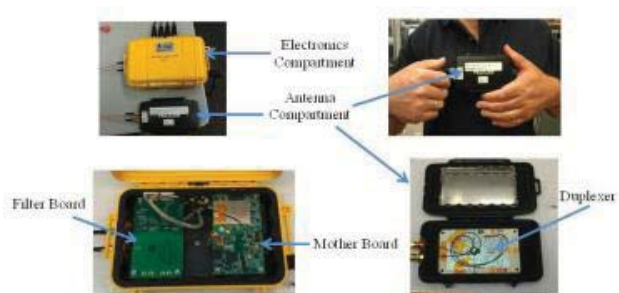
### POTENTIAL APPLICATIONS (CONT'D)

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## IMAGE GALLERY

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RFI Hardware



## ABSTRACT (CONTINUED FROM PAGE 1)

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activities.



## ANTICIPATED BENEFITS

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### **To NASA unfunded & planned missions: (CONT'D)**

NASA's tangible benefits will include easier and safer monitoring of peripheral blood flows during spaceflight, space-related operations and increased reliability due to easier operation. Non-NASA benefits: Diving, cardiopulmonary bypass patients, any situation where simple non-contact hemodynamic monitoring is required.

### **To other government agencies:**

This technology will be applicable in numerous situations such as for immediate assessment and monitoring of patients in life-threatening emergencies, during environmental stressors, and in performance of hazardous occupational tasks. For NASA these benefits will apply to both flight and ground personnel. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies.

### **To the nation:**

In clinical medicine, this device will save precious seconds in even simple assessment of pulse, while real-time measurement of cardiac stroke volume will allow critical assessment of life-threatening shock and allow medical personnel to provide optimal resuscitation in the field or in the hospital emergency department.

